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Global heat pump sales by country are tabulated in this data-file, for 14 countries/regions. Developed world heat pump sales rose at an 11% CAGR over the decade since 2012, reaching 7M units sold in 2022, but then unexpectedly fell by -10% in 2023, including YoY declines in 7 out of the 14 countries we are tracking.

Our global uranium supply-demand model sees the market 5% under-supplied through 2030, including 7% market deficits at peak in 2025, as demand ramps from 165M lbs pa to 230M lbs pa in 2030. This is even after generous risking and no room for disruptions. What implications for broader power markets, decarbonization ambitions, and uranium prices?

There are many different reasons that might motivate the deployment of a grid-scale battery, as tabulated on page 2. The most common is at a grid node, for load shifting and power price arbitrage, in ever-steeper duck curves. But interestingly, we have seen a different model gaining traction in 2022-24, which is co-deploying renewables plus batteries, as ...

Posted on August 22, 2024 August 23, 2024 by Thunder Said Energy. Oil demand: making millions? What does it take to move global oil demand by 1Mbpd? This 22-page note ranks fifteen themes, based on their costs and possible impacts, to show what drives global oil demand, where risks lie for oil markets, and where opportunities are greatest to ...

Today's lithium ion batteries have an energy density of 200-300 Wh/kg. I.e., they contain 4kg of material per kWh of energy storage. Technology gains can see lithium ion batteries' energy densities doubling to 500Wh/kg in the 2030s, trebling to 750 Wh/kg by the 2040s, and the best possible energy densities are around 1,250 Wh/kg.

Posted on October 3, 2024 December 16, 2024 by Thunder Said Energy. Mapping vehicle value chains? Who is impacted if vehicle sales, EVs or ICE volumes surprise? Autos are a \$2.7 trn pa global market, a vast 2.5% of global GDP. 15% is gross margin for OEMs. The other 85% is spread across vehicle value chains, encompassing metals, materials and ...

The energy uplifts from solar trackers have been estimated at 10-50% in different studies. But we can do better than this broad range, and actually calculate both the energy uplift and the revenue uplift from first principles, on pages 5-8. The economics of solar trackers can therefore be modeled more effectively.

Our latest published models for the energy consumption of AI assumed an additional 1,000 TWH of electricity use by 2030, within a possible range of 300 - 3,000 TWH based on taking the energy consumption of computing back to first principles. Groq's impact on these numbers is discussed on pages 6-7. NVIDIA is currently the world leader in GPUs underlying the AI revolution, which in ...



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A common framework is to call the energy transition a "dual challenge". The first task is meeting the energy needs of human civilization. And the second task is abating the world's CO2 emissions. But we increasingly think this framework is incomplete. Energy transition is a triple challenge. The third component is raising competitiveness.

We screen new energy technologies with world-changing potential, including: The Energy Transition. Our work points to an economic decarbonization of the entire energy industry by 2050, with a CO2 price that averages \$40/ton.. The Ascent of Renewables will deliver an enormous 30,000 TWH of energy by 2050, but this also requires overcoming vast bottlenecks, in metals, ...

This data-file captures the development pipeline of new US power capacity, based on 860M reports from the EIA, which cover all existing and proposed generating units of >1MW of greater. As a leading indicator for wind, solar, gas turbine and battery demand, we have aggregated the data in these c110 monthly reports, from 2015 to 2024, to track the pipeline ...

25% of global electricity came from burning 150bcfd of natural gas in 2023, generating 6,750 TWH of electricity from a fleet of 1.9 TW of gas turbines. The basic functioning, cost and efficiency of a typical gas turbine are described on pages 2-3.. Our goal in this report is to forecast the market for gas turbines through 2030. To predict the future, however, it is first ...

Posted on September 19, 2024 September 19, 2024 by Thunder Said Energy. Going platinum: PGMs in energy transition? Could PGMs experience another up-cycle through 2030, on more muted EV sales growth in 2025-30, and rising catalyst loadings per ICE vehicle? This 16-page note explores global supply chains for platinum and palladium, the long-term ...

Electric vehicle sales by manufacturer are also disaggregated for 9M BEVs and 4M PHEVs sold in 2023 and Tesla together sold 40% of the world's EVs, while the top 10 list accounts for 75% of EVs and also includes VW, Stellantis ...

This data-file contains simple estimates for the number of battery cycles required over the life of different electric vehicles, with back-up workings. For example, a US electric car, driving 10,000 miles per year, at an effective fuel economy of 3 miles/kWh is going to endure around 1,500 battery charging-discharging cycles over a 15-year life. ...

Included in the file are different oil products, gas markers, coal, wood, nuclear, biofuels, methanol, hydrogen, CO2-EOR products and the US electricity grid for comparison.. Good rules of thumb are that \$60/ton coal equates to thermal energy at 1c/kWh-th, while emitting over 600 kg/boe of CO2 intensity; while \$3/mcf gas also equates to thermal energy at 1c/kWh, while CO2 intensity ...

Electricity Prices and CO2 Intensity Data. Retail electricity prices average 11c/kWh globally, across 28,500



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TWH of global electricity demand in 2021, which is mostly composed of electricity consumption in 80 larger countries. The lower quartile is 7c/kWh and the upper quartile is 17c/kWh. The lower decile is 4c/kWh and the upper decile is 22c/kWh.

To contextualize the growth that lies ahead, we have compiled data on US power generation installations, year by year, technology by technology, running back to 1950, including implications for turbine manufacturers, on pages 14-16.. The impacts of AI on US gas and power markets sharply accelerate US electricity demand, upgrade our US shale forecasts, especially ...

This purchase will enable your email account for the Thunder Said Energy full subscription. This gives you full access to all of our content -- written research reports, downloadable data-files, economic models, patent analysis and company screens -- for one calendar year.. Additional terms: All our content can be shared fully within your organization.

Electric vehicle sales by manufacturer are also disaggregated for 9M BEVs and 4M PHEVs sold in 2023 D and Tesla together sold 40% of the world's EVs, while the top 10 list accounts for 75% of EVs and also includes VW, Stellantis (due to the Fiat 500e and Peugeot e-208) and GM (due to the Chevy Bolt range).. 2024 has seen weaker momentum for electric vehicles.

This is a simple model calculating the economics of a typical rooftop solar water heater, which can save around 1T of CO2 per household per year and lower water heating bills by 50-80%.. Economics are more challenging, due ti high upfront capital costs, which are quantified in the data-file. Under our base case estimates, it would require a CO2 price of around \$130/ton, to ...

In one of the most entertaining energy-themed advertisements of all time, Will Ferrell laments Norway's lead over the United States in electric vehicle ownership. 90% of Norway's new vehicle purchases were BEVs/PHEVs in 2023, and electric vehicles make up 26% of the fleet.What is not in the advertisement is the tax policy that has propelled EVs to such high adoption in many ...

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Shipping consumes 5Mbpd of global oil demand, emits 1.5% of the world's CO2, and adds c1% to the final cost of a typical shipped product, using \$1.8/gallon marine diesel at 9.0 kg/gal CO2 intensity.. This data-file appraises the costs of alternative shipping fuels, drawing on models from our prior work into methanol, lower-carbon ammonia, renewable-diesel, green hydrogen, and ...

Some commentators argue that energy demand will naturally plateau as GDP rises in the future - or at least the beta between energy use and GDP will fall dramatically. As evidence, the energy consumption within developed world countries has hardly increased over the past 20-years, even as GDP per capita rose by 25%.



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This data-file aggregates the details of different nature-based CO2 removals projects that we have been supporting at Thunder Said Energy. The average nature-based reforestation initiative that we supported in 2022 scored 70/100 on our framework. Statistical details and distributions are explored. Download

Posted on March 7, 2024 March 11, 2024 by Thunder Said Energy. Power grids: the biggest bottleneck in the world? Power grids will be the biggest bottleneck in the energy transition, according to this 18-page report. Tensions have been building for a decade. They are invisible unless you are looking. And power grid bottlenecks could last a decade.

This database contains a record of every company that has ever been mentioned across Thunder Said Energy's energy transition research, as a useful reference for TSE's clients. The database summarizes over 3,000 mentions of 1,400 ...

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